

Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (currently amended) A device for thermally insulating at least one undersea pipe, the device comprising:

a thermally insulating covering surrounding said pipe;

said covering itself being covered by an outer leakproof protective case, and said case being made of a flexible or semirigid material suitable for remaining in contact with the outside surface of said insulating covering when it deforms,

wherein said insulating covering comprises a phase-change material confined in ~~at least one container~~ a plurality of pre-fabricated containers having walls made of a flexible or semirigid material that is deformable; and

said container is disposed around said pipe.

2. (currently amended) The insulating device of claim 1, wherein in a cross-section of said pipe, level with at least one of said container containers, said pipe is surrounded by said at least container in a substantially continuous manner.

3. (withdrawn) The insulating device of claim 1, wherein said container is placed close to the pipe so that said pipe does not come directly into contact with said container.

4. (withdrawn) The insulating device of claim 3, wherein said container comprises a plurality of containers that are disposed against spacers, said spacers being disposed against and around said pipe in such a manner as to leave a gap between said containers and said pipe.

5. (withdrawn) The insulating device of claim 4, wherein said containers are spaced apart from said pipe by a distance of from approximately 5 mm to approximately 10 cm.

6. (currently amended) The insulating device of claim 1, wherein said pipe is surrounded by a second insulating material that is solid, and is applied against said pipe; and wherein at least one of said ~~container~~ containers is pressed against said solid insulating material surrounding said pipe.

7. (previously presented) The insulating device of claim 1, wherein said insulating covering comprises a main insulating material and a phase-change material surrounding said pipe.

8. (currently amended) The insulating device of claim 7, wherein said main insulating material surrounds said pipe and provides separation between said pipe and said plurality of containers ~~container~~ in the gap between said ~~container~~ containers and said pipe.

9. (withdrawn) The insulating device of claim 1.

wherein said pipe comprises a plurality of pipes;

wherein said container comprises a plurality of containers; and

wherein, around the portions of each pipe about which said containers are disposed, the insulating device has at least two containers in a cross-section of said pipe surrounded by said containers.

10. (previously presented) The insulating device of claim 1, wherein said phase-change material presents a liquid/solid melting temperature that is lower than the temperature of the fluid flowing in said pipe when it is in operation, and higher than the temperature at which the fluid flowing inside the pipe presents an increase in viscosity that is harmful for its ability to flow in said pipe.

11. (previously presented) The insulating device of claim 10, wherein said insulating phase-change material comprises chemical compounds of the alkane family.

12. (previously presented) The insulating device of claim 11, wherein said alkane is heptacosane of formula $C_{17}H_{36}$ presenting a melting temperature of about 50°C.

13. (previously presented) The insulating device of claim 7, wherein said main insulating material is an insulating mixture comprising a first compound consisting of a

hydrocarbon compound, mixed with a second compound consisting of at least one of a gelling compound and a structuring effect compound.

14. (previously presented) The insulating device of claim 13, wherein said first compound is selected from the group consisting of paraffins, waxes, bitumens, tars, fatty alcohols, and glycols.

15. (withdrawn) The insulating device of claim 1, further comprising at least two leaktight transverse partitions, each of said partitions being formed by a closed rigid structure having said pipe passing therethrough, and secured to said pipe and to said case, and said container being disposed around said pipe between said two transverse partitions.

16. (withdrawn) The insulating device of claim 15, wherein said transverse partitions are spaced apart along a longitudinal axis of said case by a distance of from about 50 m to about 200 m.

17. (withdrawn) The insulating device of claim 15, further comprising at least two centralizing templates located between said two successive leaktight transverse partitions along a longitudinal axis of said case, each said centralizing template being formed by a rigid part secured to said pipe and presenting a shape that allows limited displacement of said case in

contraction and in expansion in register with said centralizing template, said container being disposed between two successive ones of said centralizing templates.

18. (withdrawn) The insulating device of claim 17, wherein said centralizing template is formed by a rigid part, the centralizing template limiting deformation of said case by the case coming into mechanical abutment against said rigid part at at least two opposite points of the perimeter of the cross-section of said case, said displacement of the case being in register with said centralizing template representing variation of 0.1% to 10 of the distance between two opposite points of the perimeter of the cross-section of said case.

19. (withdrawn) The insulating device of claim 17, wherein the positioning of said rigid piece that creates a space allowing the material constituting said insulating covering to be transferred through said centralizing template.

20. (withdrawn) The insulating device of claim 16, further comprising a plurality of said centralizing templates, and wherein two successive centralizing templates are spaced apart along said longitudinal axis of the case by a distance of from about 2 m to about 5 m, with said containers being interposed between two successive ones of said plurality of centralizing templates.

21. (withdrawn) The insulating device of claims 16, further comprising at least one shaping template, each said shaping template formed by a rigid structure secured to said pipe with said pipe passing therethrough, and secured at its periphery to said case, said shaping template being disposed between two successive ones of said leaktight partitions, said shaping template having openings allowing said main insulating material to pass therethrough.

22. (withdrawn) The insulating device of claim 21, wherein said open structure of said shaping template is formed by a cylindrical part presenting a cross-section of perimeter that is inscribed in a geometrical figure identical to the geometrical figure defined by the shape of the perimeter of the cross-section of said leaktight partition.

23. (withdrawn) The insulating device of claim 21, wherein said at least one shaping template is a plurality of shaping templates disposed along said longitudinal axis of the case, two successive shaping templates being spaced apart by from about 20 m to about 50 m.

24. (previously presented) The insulating device of claim 1, wherein said case defines a perimeter presenting two axes of symmetry that are perpendicular to each other and to said longitudinal axis.

25. (withdrawn) The insulating device of claim 24, wherein said cross-section of the case is circular.

26. (withdrawn) The insulating device of claim 24, wherein said cross-section of the case is oval.

27. (previously presented) The insulating device of claim 24, wherein said cross-section of the case is rectangular.

28. (withdrawn) The insulating device of claim 1 having at least two of said undersea pipes disposed in parallel.

29. (withdrawn) The insulating device of claim 21, wherein said leaktight partitions and said shaping templates hold at least two of said undersea pipes at a fixed distance apart.

30. (withdrawn) A unit thermally insulating device suitable for building a device according to claim 1 by assembling said unit thermally insulating devices end to end, wherein the pipe is formed of at least one unit pipe element, the unit device comprising:

an insulating covering;

said protective case; and

said insulating covering, said insulating covering having at least one said container containing said insulating phase-change material;

wherein each said unit element has said leaktight partition at at least one of its ends.

31. (withdrawn) A method of assembling a unit device according to claim 30, wherein the method comprises the following steps:

- a) positioning said unit pipe element relative to said leaktight transverse partitions, then
- b) installing on said unit pipe element, one of spacers and said solid insulating material against a wall of said unit pipe element;
- c) pressing said container against said spacers or against said solid insulating material, forming thereby an assembly;
- d) inserting said assembly in said outer case; and
- e) injecting said main insulating material into the space between said container and said outer case, and into the space between said container and the walls of said unit pipe element.

32. (withdrawn) The method of claim 31, wherein said main insulating material is a mixture which is injected in the liquid state into compartments defined by said two successive leaktight partitions and said insulating material becomes transformed into a gel by at least one of its said components cross-linking.

33. (withdrawn) A method of thermally insulating at least one undersea pipe, the method comprising the steps of:

- manufacturing unit thermally insulating devices according to claim 30; and
- assembling said unit thermally insulating devices together end to end.